

Claims

1. Radiation-sensitive element comprising

(a) a substrate with at least one hydrophilic surface and

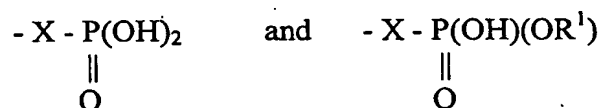
(b) a radiation-sensitive coating on at least one hydrophilic surface of the substrate, wherein the coating comprises:

(i) at least one free-radical polymerizable monomer and/or oligomer and/or polymer with at least one ethylenically unsaturated group each,

(ii) at least one absorber selected from polymerization initiators and sensitizers, which is capable of absorbing radiation of a wavelength in the range of 250 to 1,200 nm, and

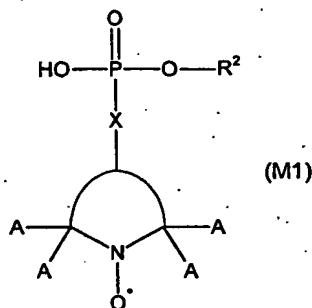
(iii) at least one stabilizer comprising in its molecule at least one group capable of inhibiting free-radical polymerization, and at least one other group capable of sorption at the hydrophilic surface of the substrate.

2. Radiation-sensitive element according to claim 1, wherein the at least one group of the stabilizer molecule capable of sorption at the substrate is selected from

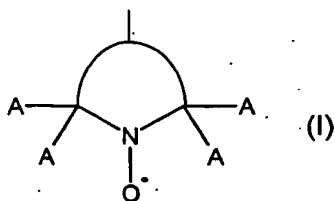


wherein R^1 is selected from C_1 - C_{18} alkyl, C_7 - C_{11} aralkyl and C_6 - C_{10} aryl and X represents a single bond, -O-, -NH or -N(C_1 - C_{10} alkyl)-.

3. Radiation-sensitive element according to claim 1 or 2, wherein the at least one group of the stabilizer molecule inhibiting free-radical polymerization is derived from stable radicals, mono-, di- or trihydroxy aromatics, quinones, nitroso compounds and mixtures thereof.
4. Radiation-sensitive element according to any of claims 1 to 3, wherein the stabilizer is a monomeric compound.
5. Radiation-sensitive element according to any of claims 1 to 3, wherein the stabilizer is a polymeric compound.
6. Radiation-sensitive element according to claim 4, wherein the stabilizer is selected from compounds of formula M1 and mixtures thereof:

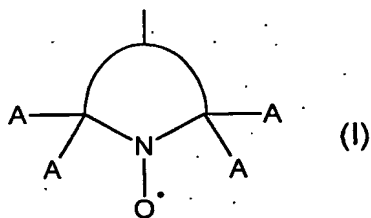


wherein X represents a single bond, -O-, -NH or -N(C₁-C₁₀ alkyl)-,
 R² is hydrogen, C₁-C₁₈ alkyl, C₇-C₁₁ aralkyl, C₆-C₁₀ aryl or

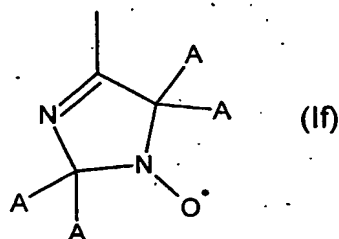
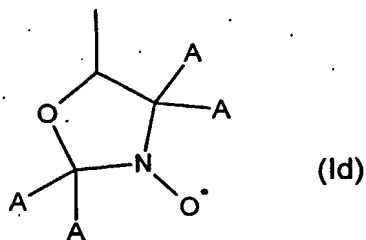
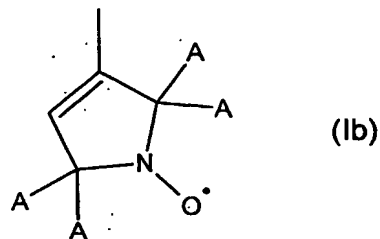
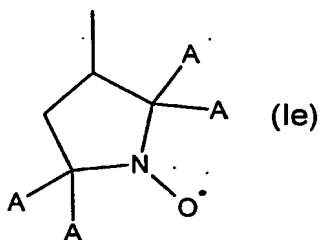
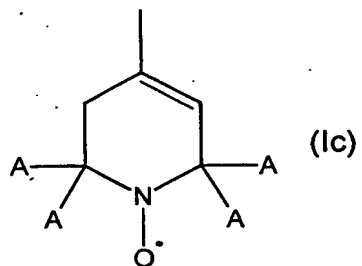
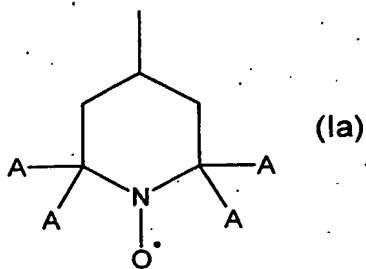


each A is independently selected from an optionally substituted C₁-C₁₀ alkyl and the nitroxyl function is part of a 5- or 6-membered heterocyclic ring, which optionally comprises one or more double bonds and optionally contains, in addition to the nitrogen atom of the nitroxyl group, one or more further heteroatoms selected from O, S, and N.

7. Radiation-sensitive element according to claim 6, wherein the unit



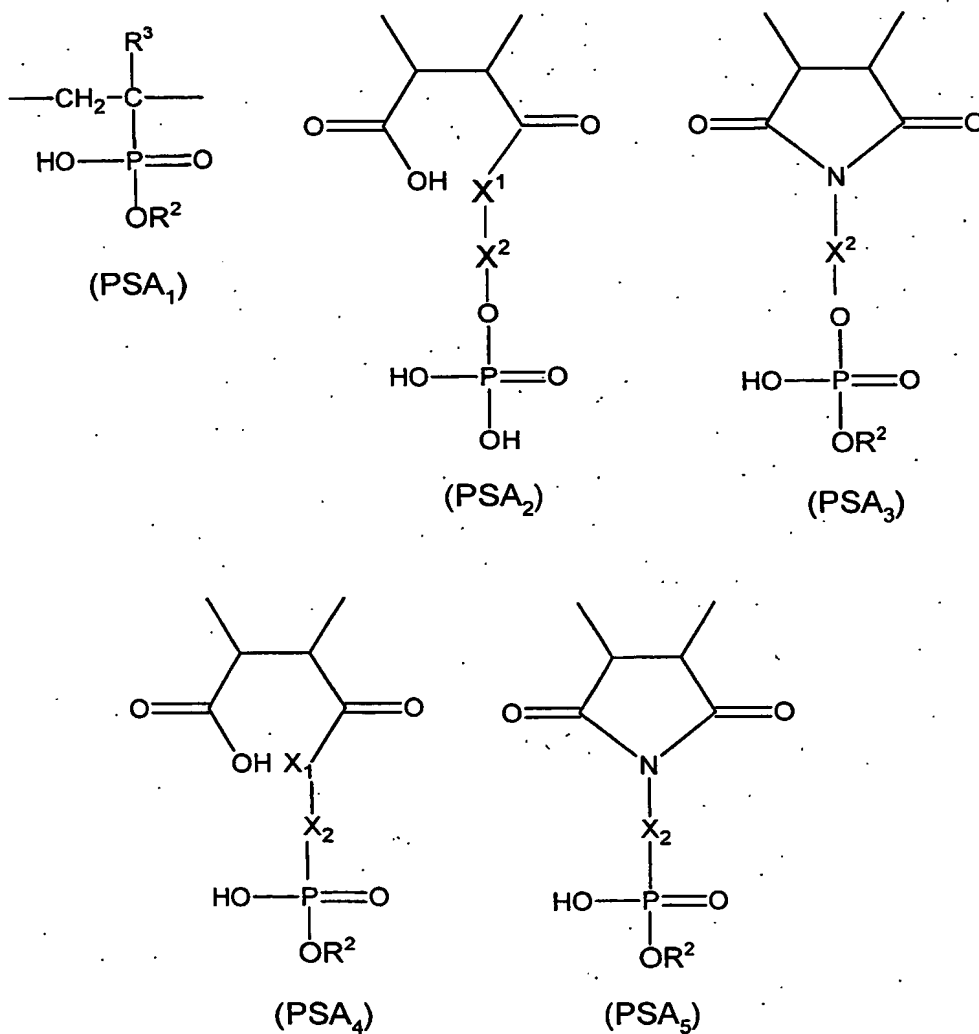
is selected from



8. Radiation-sensitive element according to claim 6 or 7, wherein X represents $-\text{O}-$.
9. Radiation-sensitive element according to any of claims 6 to 8, wherein R^2 is a hydrogen atom.
10. Radiation-sensitive element according to any of claims 6 to 9, wherein all groups A represent methyl groups.
11. Radiation-sensitive element according to claim 5, wherein the polymeric stabilizer is a copolymer obtained by polymerization of at least one of the following monomers:

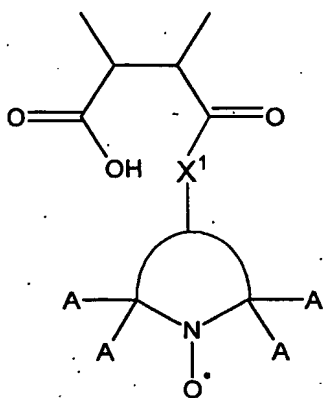
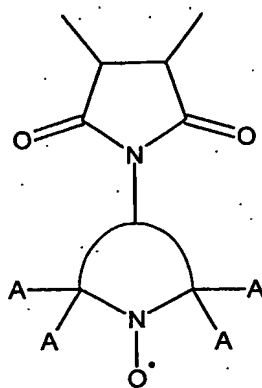
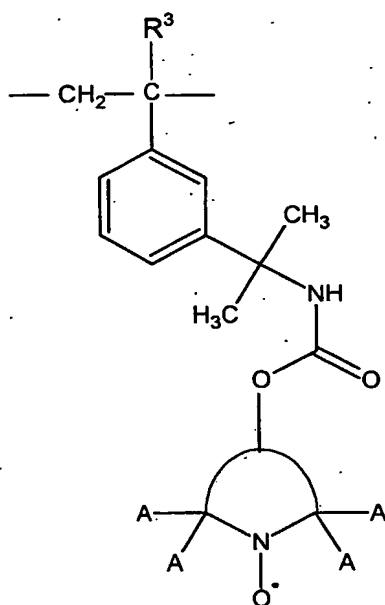
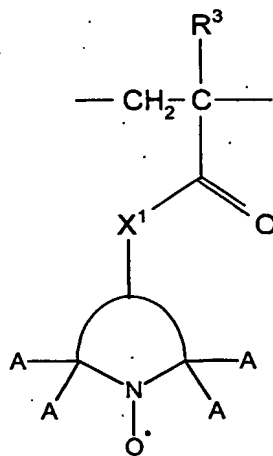
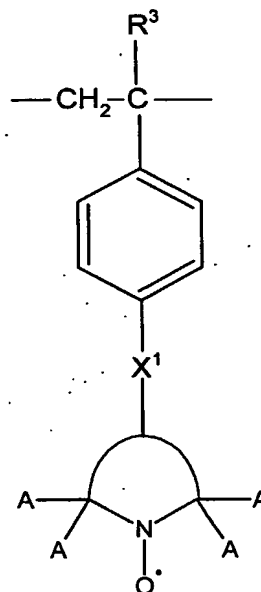
Fumaric acid, maleic acid anhydride, ethylene, propylene, acrylic acid ester, methacrylic acid ester, vinyl ester, vinyl alcohol and styrene with at least one copolymerizable monomer substituted with at least one sorption group and at least one polymerizable monomer substituted with at least one inhibitor group.

12. Radiation-sensitive element according to claim 5 or 11, wherein the polymer comprises at least one structural unit capable of sorption at the substrate selected from



wherein X² is C₁-C₁₂ alkanediyl or C₆-C₁₀ arylene, R³ is C₁-C₁₂ alkyl, X¹ is selected from -O-, -NH- and -N(C₁-C₁₀ alkyl) and R² is selected from a hydrogen atom, C₁-C₁₈ alkyl, C₇-C₁₁ aralkyl and C₆-C₁₀ aryl.

13. Radiation-sensitive element according to any of claims 5, 11, and 12, wherein the polymer comprises at least one structural unit capable of inhibiting free-radical polymerization selected from:

(PI₁)(PI₂)(PI₃)(PI₄)(PI₅)

wherein A is defined as in claim 6 and X¹ and R³ are defined as in claim 12 and the nitroxyl function is part of a 5- or 6-membered heterocyclic ring, which optionally comprises one or more double bonds and optionally contains, in addition to the nitrogen atom of the nitroxyl group, one or more further heteroatoms selected from O, S, and N.

14. Radiation-sensitive element according to any of claims 1 to 13, wherein the radiation-sensitive coating furthermore comprises at least one additive selected from coinitiators, which form free radicals after the excitation of the initiator or sensitizer with radiation of a wavelength of 250 to 1,200 nm, binders, dyes, plasticizers, chain transfer agents, leuco dyes, inorganic fillers, surfactants and polymerization inhibitors not suitable for sorption at the surface of the substrate.
15. Radiation-sensitive element according to any of claims 1 to 14, wherein at least 80 wt.-% of the stabilizer (iii) are sorbed at the hydrophilic surface of the substrate.
16. Radiation-sensitive element according to any of claims 1 to 15, wherein the substrate is an aluminum foil or plate having a hydrophilic surface on at least one side.
17. Radiation-sensitive element according to any of claims 1 to 16, wherein the element furthermore comprises an oxygen-impermeable overcoat.
18. Process for the production of a radiation-sensitive element as defined in any of claims 1 to 16 comprising:
 - (a) providing an optionally pretreated substrate having a hydrophilic surface;
 - (b) applying a radiation-sensitive mixture comprising
 - (i) at least one free-radical polymerizable monomer and/or oligomer and/or polymer with at least one ethylenically unsaturated group each,
 - (ii) at least one absorber selected from photoinitiators and sensitizers, which is capable of absorbing radiation of a wavelength in the range of 250 to 1,200 nm,
 - (iii) at least one stabilizer comprising in its molecule at least one group capable of sorption at the hydrophilic surface of the substrate, and at least one other group capable of inhibiting free-radical polymerization,
 - (iv) a solvent or solvent mixture, and
 - (v) optionally at least one additive selected from coinitiators, which form free radicals after the excitation of the initiator or sensitizer with radiation of a

wavelength of 250 to 1,200 nm, binders, dyes, plasticizers, chain transfer agents, leuco dyes, inorganic fillers, surfactants and polymerization inhibitors not suitable for sorption at the surface of the substrate;

and

c) drying.

19. Process for the production of a radiation-sensitive element as defined in any of claims 1 to 16 comprising:

- (a) providing an optionally pretreated substrate having a hydrophilic surface;
- (b) applying a mixture that is not radiation-sensitive comprising at least one solvent and at least one stabilizer comprising in its molecule at least one group capable of sorption at the substrate and at least one group capable of inhibiting free-radical polymerization;
- (c) drying;
- (d) applying a radiation-sensitive mixture comprising
 - (i) at least one free-radical polymerizable monomer or oligomer and/or polymer with at least one ethylenically unsaturated group,
 - (ii) at least one absorber selected from polymerization initiators and sensitizers, which is capable of absorbing radiation of a wavelength in the range of 250 to 1,200 nm,
 - (iii) a solvent or solvent mixture, and
 - (iv) optionally at least one additive selected from coinitiators, which form free radicals after the excitation of the initiator or sensitizer with radiation of a wavelength of 250 to 1,200 nm, binders, dyes, plasticizers, chain transfer agents, leuco dyes, inorganic fillers, surfactants and polymerization inhibitors not suitable for sorption at the surface of the substrate;

and

(e) drying.

20. Process according to claim 18 or 19, wherein the process furthermore comprises the step of applying an oxygen-impermeable overcoat.

21. Process according to any of claims 18 to 20, wherein the optionally pretreated substrate with a hydrophilic surface is an aluminum foil or plate, which prior to coating was optionally subjected to at least one treatment selected from roughening, anodizing and application of a hydrophilizing layer.
22. Radiation-sensitive element obtainable by the process as defined in any of claims 18 to 21.
23. Lithographic printing form obtainable by
 - (a) providing a radiation-sensitive element as defined in any of claims 1 to 17 and 22;
 - (b) image-wise exposure of the element with radiation of a wavelength adjusted to the absorber contained in the radiation-sensitive coating;
 - (c) optionally heating the irradiated element;
 - (d) removing the unexposed areas of the coating with an aqueous alkaline developer;
 - (e) optionally heating the developed printing form and/or subjecting it to overall exposure.